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DESIGN CRITERIA

HIGH-LEVEL WASTE INTERIM STORAGE SYSTEM

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RECORD OF REVISION

PROCEDURE

If there are changes to the controlled document, the revision number increases by one. Depending on the document type (per WV-100) changes are indicated by:

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HIGH-LEVEL WASTE INTERIM STORAGE SYSTEM

Rev. 2

1.0 SCOPE

This document presents the design criteria for the system to provide interim storage and handling of the canisters of vitrified high-level waste (HLW) on the WVDP site, and for storage of failed or used process equipment that is contaminated with radioactive material from the Vitrification Facility (VF). The facilities, equipment, operations, and the requirements associated with the storage of the waste are described herein.

1.1 Description

The High Level Waste Interim Storage (HLWIS) system shall be capable of receiving HLW canisters that were filled within and transferred from the VF Cell. In addition, provision shall be made for unloading, storing, and transferring the loaded canisters from the storage facility to the ship-out facility for shipment to another interim storage facility or a final Federal repository. The design of the ship-out facility is not included in the storage system design scope, but due consideration shall be given so that ship-out is not unduly complicated by the design of the storage system.

The HLWIS System consists of canister storage racks, radiation shielding, contamination containment, canister cooling, canister handling equipment, and canister monitoring equipment.

The HLWIS system shall be located in the Chemical Process Cell (CPC), an existing structure at the WVDP site.

1.2 Terms and Definitions

ADS - Air Displacement Slurry (pump)

CPC - An existing shielded cell which was previously used as a remotely operated Chemical Process Cell

CCR - The Chemical Crane Room of the existing process building. This room was used as a shielded crane repair room for the CPC.

CFMT - Concentrator Feed Make-up Tank

DBE - Design Basis Earthquake

EDR - The Equipment Decontamination Room of the existing process building. This room was used to decontaminate used equipment from the CPC prior to disposal.

HEV - The main plant Head End Ventilation system.

HLW - High Level Waste

HLWIS - All components which make-up the High Level Waste Interim Storage System

RACKS - Support structures used to hold canisters in fixed identifiable locations, protecting them from damage.

SHALL - Indicates mandatory requirements.

SHOULD - Indicates discretionary guidelines, where mandatory compliance may conflict with other requirements of this document.

TRU - Transuranic Waste - Waste with a long lived alpha emitting transuranic isotope content greater than 100 nanocuries/gm.

VF Cell - The remotely operated facility where HLW will be Vitrified.

WVDP - West Valley Demonstration Project

2.0 FUNCTIONAL REQUIREMENTS

The HLWIS system provides for the interim storage of canisters of vitrified HLW until the canisters are shipped to another interim storage facility or a final Federal repository.

The HLWIS system shall provide for the following functions:

2.1 Storage in racks for at least 372 HLW canisters generated during Phase I operations of the vitrification facility. This is based on the worst case credible production estimate (352 canisters) from Reference [1] with an additional twenty canisters associated with start-up, melter flush-out, upsets (partially filled canisters), and the Evacuation Canisters.

2.2 HLW canisters generated during any future phase II operations of the vitrification system are not included in the scope of this design criteria since it is unknown at this time whether any of the waste generated during phase II operations will be vitrified.

2.3 Additional storage capacity for failed or used VF equipment shall be provided. Based on experience to date and industry wide experience with similar equipment, the following items are likely to require storage until a size reduction and decontamination facility is available:

2.3.1 2 primary cell HEPA filter assemblies (3 filters each assembly) - drawing E&W 68E2-3

2.3.2 9 primary cell roughing filter assemblies (2 filters each assembly) - drawing E&W 68E2-4

2.3.3 2 off-gas filter housings - drawing PNL-276-01

2.3.4 2 melter off-gas jumpers - drawing PNL-642

2.3.5 1 set start-up heaters - drawing PNL-260

2.3.6 6 discharge heaters - drawing PNL-012-01

2.3.7 1 sample module - drawing PNL-402-01

2.3.8 1 sample flow control module - drawing PNL-402-01

2.3.9 1 concentrator feed make-up tank (CFMT) agitator - drawing PNL-255-01

2.3.10 1 concentrator feed tank agitator - drawing 900-E-977

2.3.11 1 air displacement slurry (ADS) pump - drawing 900D-2466

2.3.12 11 miscellaneous jumpers (Approx. 2-inch dia., 8-foot dog-leg)

2.4 The HLWIS System shall provide storage space for 12 remotely handled Transuranic Waste (TRU) containers which are presently stored in the CPC. The containers are 55.88 cm diameter x 106.68 cm tall carbon steel canisters. (Drawing 900-C-1059)

2.5 Interface with a transfer cart(s) capable of moving canisters and/or equipment into the storage area on existing rails. The design of the transfer cart is not in the storage system design scope.

> 2.6 Shielding to permit access as required by Section 4.4 of this document.

2.7 A canister closure, either permanent or temporary, must be attached by others prior to storage.

2.8 A means of dissipating the decay heat from the HLW canisters while stored in racks within the CPC to maintain the CPC air temperature below 38°C (100°F). This temperature limit is required to protect the concrete shielding and any in-cell equipment from damage. The total heat generation rate of the HLW based on decay heat in 1996 is 72000 watts.[3] Additional mechanical and electrical loads within the storage facility shall be included in the total heat load.

2.9 A means of dissipating the decay heat from each HLW canister while stored in racks within the CPC to maintain the canister centerline temperature below 400°C (752°F) as required by Reference [4]. The decay heat for each canister is dependent on the amount of HLW in the canisters. The decay heat ranges from 295 watts/canister for the minimum production of 244 canisters to 204 watts/canister for the maximum production of 352 canisters.[1][3] An analysis shall be performed to demonstrate that natural convection with the storage system configuration and ambient air in the CPC will provide sufficient cooling to meet this requirement.

2.10 Capability to monitor the CPC air temperature to ensure that the temperature requirements of this document are satisfied.

2.11 Capability of handling a single HLW canister in a normally vertical position and in accident condition intermediate or horizontal position.

2.12 Capability of maintaining the CPC at a negative pressure with respect to the cell external environment for contamination control purposes as described in Reference [5].

2.13 The HLWIS shall be designed to store HLW canisters for a 20 year interim period.

2.14 After 20 years of normal storage and any minor off-normal occurrences, all canisters shall meet the Federal repository acceptance requirements, as defined in Reference [4].

2.15 All equipment installed inside the CPC shall be designed to accommodate installation, maintenance, and removal after the canister storage period by remote handling methods. The existing CPC cranes shall be used for remote operations and the Chemical Crane Room will be used as a shielded maintenance area for the cranes. Design consideration shall be given to minimize the in-cell maintenance activities and to minimize the production of contaminated components.

2.16 The design shall provide redundancy for critical components that may require maintenance or replacement unless these components can be repaired or replaced in sufficient time to meet the design criteria requirements.

2.17 Viewing capability to monitor operations shall be provided.

3.0 OPERATIONAL REQUIREMENTS

3.1 The operational requirements of the HLWIS System shall include the following:

3.1.1 All canister handling shall be done remotely.

3.1.2 Operating personnel shall maintain visibility of the handling operations at all times using shield windows and/or video equipment.

> 3.1.3 The maximum radiation dose for a <u>full-time occupancy</u> area shall be 0.25 mRem/hour. A full-time occupancy area is one in which an individual(s) may be expected to spend all or most of his or her work day.

3.1.4 The maximum radiation dose for a <u>full-time access</u> area shall be 2.5/t Mrem/hr in which "t" is the maximum average time in hours per day that the area is expected to be occupied by any one individual. A full-time access area is one in which no physical or administrative control or entry exists. If compliance with full-time access area requirements would be economically not feasible, impractical or prohibitive, higher dose rates may be allowed. However, access to such fields shall be strictly controlled.

3.1.5 The handling equipment shall be remotely replaceable or repairable in a shielded area.

3.1.6 The storage racks shall accommodate loading and unloading one canister at a time.

3.1.7 The storage facility shall have sumps which are able to detect, collect, and remove any water inadvertently released into the CPC.

3.1.8 The storage racks shall have a storage location identification system which uniquely identifies each canister with its storage location.[6]

3.1.9 The existing plant air monitoring method will be utilized for monitoring ventilation discharge and operating aisle contamination levels.

3.1.10 The existing plant area radiation monitoring equipment will be utilized for monitoring operating aisle radiation levels.

3.1.11 Any portion of the cooling equipment located in the CPC will be maintained by remote replacement. Any cooling equipment located outside of the CPC will be maintained by contact maintenance.

3.1.12 The controls for the CPC cranes, the EDR/CPC shield door, the canister transfer cart, and the CPC/EDR video cameras shall be located at a common operating point near a CPC shielded viewing window.

3.2 <u>Operations Outline</u>

3.2.1 Canisters are filled within the VF Cell. The lids are welded onto the canisters. The canisters are decontaminated and then they are transferred to the CPC in a canister restraining rack mounted atop the canister transfer cart.

3.2.2 Canisters are then unloaded individually from the canister transfer cart in the CPC and are loaded into the storage racks.The transfer cart is returned to the EDR.

3.2.3 Empty canisters are loaded onto the canister transfer cart in the EDR which is transported back into the VF Cell where the empty canisters are unloaded and are replaced with the filled canisters. Only empty canisters are to be handled by the EDR crane due to inadequate back-up, recovery and repair capabilities in EDR.

4.0 DESIGN REQUIREMENTS

4.1 Location

The HLWIS System shall be located in the CPC located south of the VF cell. Reference Drawings 905-D-031, 032, 036.

4.2 Viewing

Canister handling shall be controlled from outside of the radiation shielding. Sufficient operator visibility, through shielded viewing windows and/or by remote TV, shall be provided to facilitate operator handling of canisters and contaminated equipment.

4.3 Lighting

Lighting shall be of the high pressure sodium bulb type. Design of the In-cell lighting fixtures shall be the same as the original design. i.e., The existing in-cell light housings shall be used with high pressure sodium type light bulbs. Crane lighting shall be upgraded to use standard commercial fixtures with HP sodium bulbs.

4.4 Shielding

The CPC walls shall provide sufficient shielding to meet the following radiation criteria with racks containing all of the vitrified HLW storage canisters (each having a maximum dose rate of 9500 rads/hr at contact).[2][7] A listing of the quantities of radioactive isotopes contained in the HLW canisters is given in Reference [4].

The maximum radiation dose for a full-time occupancy area shall be 0.25 Mrem/hour. A full-time occupancy area is one in which an individual(s) may be expected to spend all or most of his or her work day.

The maximum radiation dose for a full-time access area shall be 2.5/t Mrem/hr in which "t" is the maximum average time in hours per day that the area is expected to be occupied by any one individual. A full-time access area is one in which no physical or administrative control or entry exists. If compliance with full-time access area requirements would be economically not feasible, impractical or prohibitive, higher dose rates may be allowed. However, access to such fields shall be strictly controlled.

4.5 Structural Requirements

New structures that are not required to confine radioactive material shall be designed to the New York State "Code Manual for the State Building Construction Code" and the loadings specified in this section.

Structures and components that are required to confine radioactive material that could be hazardous to the public or site personnel shall be able to withstand the effects of the loadings in this section without loss of capability to perform safety function(s) and prevent the release of radioactivity.

Since the canister storage racks are not a confinement structure, they shall be designed using the New York State "Code Manual for the State Building Construction Code", the "Uniform Building Code (UBC) 1991 edition" and the "American Institute of Steel Construction" manual.

The CPC structure is an existing building at the WVDP site. Per DOE 6430.1A, General Design Criteria, "For existing facilities, original design criteria apply to the structure in general". The CPC structure was originally designed to the 1961 Uniform Building Code utilizing UBC-1961 Earthquake Loads and other loads from ANSI A58.1-1955. Modifications to the existing CPC structure shall be designed in accordance with the Uniform Building Code (UBC) 1991 edition.

4.5.1 Canister Storage Rack Loads

The filled HLW canisters (900-D-1092) shall always be supported so that they will not incur any damage that would prohibit them from meeting the Federal repository acceptance criteria [4]. The following accident scenarios shall be considered:

Accidental bumping with a crane suspended load or canister handling equipment.

The Uniform Building Code Earthquake.

A. Dead Loads shall be that of the completely loaded racks with 90 percent filled canisters (2240 kg/canister, 4928 pounds/canister [7]).

B. Earthquake loads and evaluation shall be, as a minimum, in accordance with the Uniform Building Code (UBC) 1991 edition. More rigorous analysis techniques shall be used to confirm rack deflections and performance during a postulated seismic event.

4.5.2 CPC Structure Loads

A. Dead Loads shall be that of the existing facility plus the load of 90 percent filled canisters (2240 kg/canister, 4928 pounds/ canister [7]) in completely loaded storage racks.

B. Live Loads shall be that of the existing facility and a load of 7181 Pa (150 PSF) distributed on the portion of the floor not occupied by the storage racks.

C. Earthquake loads and evaluation shall be, as a minimum, in accordance with the Uniform Building Code (UBC) 1991 edition.

D. The CPC structure shall withstand operating and ambient temperatures in combination with other loadings without incurring total structural failure. The exterior ambient conditions are reflected in Reference [9].

Thermal load is the load induced by normal gradients across the walls and slabs between the building interior and the external environment. The conditions to be considered shall be:

SUMMER

CPC Interior	15°C - 38°C (60°F - 100°F)
Exterior Sustained Concrete Temperature	10°C - 29°C (50°F - 85°F)
Enclosure above El. 148.0' (Vent. Exh. Cell)	15°C - 49°C (60°F - 120°F)
Chemical Aisle El. 114.0' to El.131.0'	21°C - 41°C (70°F - 105°F)

WINTER

CPC Interior	15°C - 38°C (60°F - 100°F)
Exterior Sustained Concrete Temperature	-17°C - 10°C (2°F - 50°F)
Enclosure above El. 148.0' (Vent. Exh. Cell)	15°C - 27°C (60°F - 80°F)
Chemical Aisle El. 114.0' to El.131.0'	21°C - 27°C (70°F - 80°F)

Thermal loads for the foundation mat shall be based on a constant (summer and winter) temperature of 13°C (55°F) for material underlying the mat.

E. Negative pressure range with respect to the outside atmosphere of zero to negative 249 Pa (minus 1 inch of water column).

F. Wind forces on the building exterior as specified in the Uniform Building Code (UBC) 1991 edition.

G. Snow load as specified in the Uniform Building Code (UBC) 1991 edition.

H. No flood loads are required. [13]

4.5.3 Auxiliary Equipment

Auxiliary equipment required to satisfy the requirements of this document shall be designed such that they shall remain secured and intact when subjected to the Uniform Building Code (UBC) 1991 edition earthquake loads. The auxiliary equipment is not required to remain operational during an earthquake. However, the equipment must be repairable or replaceable in sufficient time to meet the design criteria requirements. An analysis or equivalent (testing,etc.) shall be performed to demonstrate that these requirements are met.

4.6 Materials

Materials of construction for the storage system shall be carbon steel and/or stainless steel. All contact points with the canisters throughout the storage facility shall have stainless steel surfaces to avoid contact between a carbon steel framework and the stainless steel canister to prevent corrosion or other contamination of the canisters. Protective coatings shall be used on carbon steel.

4.7 Seismic Requirement

The storage rack system shall be designed so that when subjected to the Uniform Building Code (UBC) 1991 edition earthquake loads, no damage shall result to the canister(s) that contain the vitrified HLW such that they do not meet the repository acceptance criteria.[4] After an earthquake has occurred, the canisters shall be capable of being removed by use of the normal canister handling equipment, i.e., no tipping shall be allowed. In addition, all auxiliary equipment shall be designed such that they shall remain secured to prevent possible damage to the canisters. An analysis or equivalent (testing,etc.) shall be performed to demonstrate that these requirements shall be met.

4.8 Radiation Resistance

Materials used in all components of the storage system shall accommodate the radiation field produced by vitrified HLW canisters which each emit a maximum of 9500 rads/hr at contact.[2][7]

4.9 Cooling

The storage system ambient air temperature shall be maintained between 15°C (60°F) and 38°C (100°F) to ensure that the CPC concrete structure and any in-cell equipment is not damaged. In addition, it shall be demonstrated by analysis that this will maintain the canister centerline temperature below 400°C (752°F) as required by [4].

The total estimated decay heat load for the stored vitrified glass is 72,000 watts.[3] with a maximum heat load of 295 watts per canister. The heat capacity of the vitrified HLW is given in Reference [7]. Additional mechanical and electrical heat loads within the storage facility shall be included in the total required cooling heat load. The in-cell lighting heat load (7kw estimated) and the heat load generated by any in-cell equipment is also to be included.

If required, provide additional in-cell air circulation and/or ducting to meet the aforementioned temperature and heat transfer requirements. The air distribution method should minimize the deposition of airborne sediment in the CPC containment area and should attempt to promote a uniform CPC temperature distribution. An analysis shall be performed to demonstrate that even without the benefit of forced air circulation, natural convection of ambient CPC air will maintain the canister centerline temperature below 400°C (752°F).

The cooling system design life shall be 20 years. All equipment installed inside the CPC cell shall accommodate installation, maintenance, and removal by remote handling methods. Design consideration shall be given to minimize the in-cell maintenance activities and to minimize the production of contaminated components. The in-cell equipment will be exposed to a temperature range between 15°C (60°F) and 38°C (100°F) as well as exposed to a radiation field produced by vitrified HLW canisters which each emit a maximum of 9500 rads/hr at contact.

All new cooling system equipment shall be designed such that it shall remain secured and intact when subjected to the Uniform Building Code (UBC) 1991 edition earthquake loads. The cooling system is not required to remain operational during an earthquake event. However, the equipment must be repairable or replaceable in sufficient time to meet the design criteria requirements. An analysis or equivalent (testing,etc.) shall be performed to demonstrate that these requirements are met.

The cooling system equipment shall not jeopardize either the CPC purge flow and negative pressure balance or the purge flows and pressure balances in the other cells served by the Head End Ventilation (HEV) system.

Calculations and equipment suppliers' specification data sheets shall be submitted to demonstrate that the design criteria are satisfied.

4.10 Ventilation for Contamination Control

The cell shall be maintained under a negative pressure with respect to the cell external environment to contain any possible loose contamination per the requirements for Zone II as described in Reference [5]. The existing plant Head End Ventilation (HEV) system will be used to provide this ventilation and negative pressure.

4.11 Design Life

The HLWIS System shall be designed to be maintainable for a useful life of 20 years with no personnel access permitted in the presence of unshielded canisters.

4.12 Sampling

There is no glass sampling requirement for canisters while in the storage system. It is intended that glass sampling shall be performed prior to transfer to storage in the CPC.[6]

4.13 Nuclear Criticality Control

The HLWIS System is assumed to be criticality safe due to low concentrations of fissile nuclides. Criticality safety of the system shall be demonstrated by analysis prior to storage of the HLW filled canisters in the CPC.

4.14 Material Handling

The existing CPC 16-ton/2-ton crane 3V-1 shall be used for material handling inside the HLWIS. The details of the crane are shown on drawings VP-4413-3-V-57-1-4 and VP-4413-3-V-57-6-2. Upgrades to the crane shall comply with CMAA-70. Provisions shall be made for recovery of a failed crane to the Chemical Crane Room including provisions for lowering suspended loads prior to recovery. Any below-the-hook lifting devices required should comply with ANSI/ASME B30.20.

4.15 Piping

Piping used in the HLWIS shall meet or exceed the requirements of ANSI B31.3.

4.16 Sumps

The storage facility shall have sumps which are able to detect, collect, and remove any water inadvertently released into the CPC.

5.0 INTERFACES

5.1 The ventilation system will discharge into the main plant Head End Ventilation system via existing flow paths. The existing plant ventilation system is described by drawings 15R-A-74 and 15R-A-75.

5.2 The canister transfer cart system shall be used to transport loaded canisters from the VF Cell to the HLWIS storage system and return to the VF Cell with empty canisters on existing rails. Design of the transfer cart system is not included in the HLWIS scope of work. (Drawings 900-D-4862 & 900-D-4869)

5.3 The HLWIS System shall interface with the HLW storage canisters. The canister is characterized by the dimensions given on Drawing 900-D-1092. Any changes to these dimensions will require a review of the storage system for adequacy.

5.4 The HLWIS System may make use of an individual canister lift fixture of the same design as that used in the Vitrification Cell. The design of this canister lift fixture is not in the HLWIS scope of work. (Drawing E-2034-1000)

5.5 Empty canisters shall be transferred into the EDR and loaded onto the canister transfer cart in the EDR using the EDR crane(15V-21). The EDR crane is shown on drawings 15A-M-26, 15A-M-27, and VP-4413-15-V-77-1-1.

5.6 The EDR crane(15V-21) shall not handle partially or completely filled HLW canisters due to the inadequate back-up, recovery, and repair capabilities in EDR.

5.7 The existing Head End Vent contamination control ventilation system may provide back-up cooling capacity in the event of a primary cooling system outage. This back-up system combined with the inherent thermal capacitance of the canister storage system may provide time to repair or replace the primary canister cooling system rather than having to provide redundant cooling equipment.

5.8 The main plant liquid waste handling system shall be used to discharge any liquids collected on the floor of the CPC. Details of the liquid waste handling system are shown on drawings 3R-A-1, 7R-A-1, 7R-A-2, and 15R-A-6.

5.9 Piping inside of the CPC shall interface with Purex nozzles as shown on drawings PNL-316-01, PNL-324-01, and PNL-334-01.

5.10 The HLWIS System shall interface with the HLW Evacuated Canister System. These canisters are filled with molten glass when the VF-cell Melter is emptied of molten glass. The canisters will be stored in the HLWIS storage racks. The proposed Evacuated Canister is anticipated to have the same configuration as the HLW Storage Canisters. Any changes to these dimensions will require a review of the storage design for adequacy.

6.0 QUALITY ASSURANCE REQUIREMENTS

All design, fabrication, and testing shall be in accordance with ASME NQA-1-1989, "Quality Assurance Program Requirements for Nuclear Facilities" and, as applicable, DOE RW-0214, "Quality Assurance Requirements Document for the Civilian Radioactive Waste Management Program".

7.0 APPLICABLE CODES AND STANDARDS

The following codes and standards are applicable to the design of the HLWIS where specifically referred to herein. Unless specified herein, the code or standard effective date is the contract or order placement date.

AISC Manual	Manual of Steel Construction
ACI 318	Building Code Requirements for Reinforced Concrete
ANSI A58.1	Minimum Design Loads for Buildings and Other Structures; NRC Adopted
ASME NQA-1	Quality Assurance Program Requirements for Nuclear Facilities
ANSI B30.2	Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley)
ANSI B31.3	Chemical Plant and Petroleum Refinery Piping
ANSI N101.6	Concrete Radiation Shields, 1972
ANSI N300	Design Criteria for Decommissioning of Nuclear Fuel Reprocessing Plants
AWS D1.1	Structural Welding
DOE ORDER 5480.1	Environmental Protection, Safety and Health Protection Program for DOE Operations
DOE ID 12044	Operational Safety Design Criteria Manual
DOE 6430.1A	General Design Criteria
DOE RW 0214	Quality Assurance Requirements Document for the Civilian Radioactive Waste Management Program
C.M.A.A. No. 70	Crane Manufacturers Association of America Specification No. 70, Specifications for Electric Overhead Traveling Cranes

NYS Code	New York State "Code Manual for the State Building Construction Code"
UBC	Uniform Building Code, International Conference of Building Officials, 1991 edition

8.0 SYSTEM COMPONENTS, QUALITY LEVEL, AND SAFETY CLASS

Table 8.1 lists the Safety Class and the resulting Quality Level for significant new construction and modified existing construction components that may be included in the HLWIS design. These categories are defined in WVDP-QM-3, Design Control [8]. In accordance with DOE 6430.1A General Design Criteria, these Quality Levels do not imply that existing buildings or equipment need to be upgraded in Quality Level.

TABLE 8.1 SAFETY CLASS AND QUALITY LEVELS FOR HLWIS COMPONENTS			
COMPONENT OR SYSTEM	SAFETY CLASS	NOTES	QUALITY LEVEL
Concrete Shielding	C	(2)	B
Shielded Viewing Windows	C	(2)	B
EDR/CPC Door	C	(2)	B
Jumpers	N	(1)	C
Penetrations, Pipes, and Isolation Valves	C	(1)	C
Cooling Tower	N	(2)	N
Canister Cooling Equipment (In-Cell)	N		B
Canister Handling Equipment	N		C
Overhead Cranes	N	(2)	B
Auxiliary Hoists and Cranes	N	(2)	B
Remote Manipulators	N	(1) (2)	C
Storage Racks	N		B
Area Radiation Monitors	C	(1) (2)	C
Airborne Particulate Monitors	C	(1) (2)	C
Closed Circuit Television System	N	(1)	C
In-Cell Lights	N	(1)	C
Communications Equipment	N	(2)	C
Electronics Instruments and Controls	N	(1)	C
Pneumatic Instruments and Controls	N	(1)	C
Main Plant Head End Ventilation System	C	(2)	B
Cell Penetrations	C		B
Ducting (In-Cell)	C		B
NOTES			
(1) Spare or spare subcomponents are provided.			
(2) Existing structure or component.			

9.0 REFERENCES

1. Letter OG:88:0400, S.M. Barnes to J.M. Pope, "Chronological Review of HLW Glass Production and Processing Time Requirements", dated November 28, 1988.

> 2. "Operational Safety Design Criteria Manual," ID 12044, dated April 1985. W. L. Williams, Operational Safety Division, Department of Energy.

3. Letter WD:86:0804, L.E. Rykken to W.W. Bixby, "Reference Radionuclide Content of High-Level Waste", dated November 10,1986.

4. "Waste Compliance Plan for the West Valley Demonstration Project High-Level Waste Form", WVNS-WCD-001.

5. ERDA 76-21 "Nuclear Air Cleaning Handbook".

6. Letter OB:88:0096, J. M. Pope to C.J. Winkler, "Design Criteria for SFCM Glass Sampling", dated November 10, 1988.

7. "Description of the West Valley Demonstration Project Reference High-Level Waste Form and Canister", R.L. Eisenstatt, July 28,1986, DOE/NE/44139-26

8. WVNS Quality Assurance Program Plan, WVDP-002.

9. FAX, G. Mazik to E. Picazo, "Dames & Moore - West Valley 1989 Meteorological Data", dated July 26, 1990.

9.1 REFERENCE DRAWINGS

E&W 68E2-3	Filter Handling Frame
E&W 68E2-4	Prefilter Handling Frame
PNL-276-01	Off-Gas Prefilter
PNL-642	Jumper Assembly
PNL-260	SFCM Start-up Heaters
PNL-012-01	Melter Discharge
PNL-402-01	Slurry Sample System
PNL-255-01	CFMT Agitator
900E-977	Concentrator Feed Tank Agitator
900D-2466	ADS Sample Pump

900C-1059	Hi-Vac Collection Containers
905D-031, 032, 036	CPC General Arrangement
VP-4413-3-V-57-1-4 VP-4413-3-V-57-6-2	CPC 16-Ton/2-Ton crane 3V-1
15R-A-74, 15R-A-75	Main Plant Ventilation system
900D-4862, 900D-4869	Canister Transfer Cart System
900D-1092	HLW Storage Canister
E-2034-1000	Canister Lift Fixture
15A-M-26, 15A-M-27, VP-4413-15-V-77-1-1	EDR Crane 15V-21
3R-A-1, 7R-A-1, 7R-A-2, 15R-A-6	Main Plant Liquid Waste Handling System
PNL-316-01, 324-01, 334-01	Purex piping nozzles inside of CPC